

the field of observation. The ratio for Washington, D. C., is about 4.0, that is to say, in order to ascertain the number of thunderstorm days for a region equal in area to the adjoining States of Maryland and Virginia we have only to multiply the number observed at Washington by the constant 4.0.

Thunderstorms were reported on a greater number of days in 1900 than in the preceding year. The increase was most marked on the Pacific coast, in Texas, Arkansas, Louisiana,

Oklahoma, Indian Territory, and the eastern foothills of the Rocky Mountains. The States and Territories in which the number of thunderstorm days reported in 1900 was less than in the preceding year are Arizona, District of Columbia, Maryland, Virginia, Ohio, Tennessee, West Virginia, Indiana, and South Dakota. The number of voluntary stations reporting thunderstorms in each of the several States is substantially the same as in the preceding year.

SPECIAL CONTRIBUTIONS.

FRESHETS IN JAMES RIVER, VA.

By E. A. EVANS, Section Director, reprinted from Annual Summary.

The accompanying tables, showing flood heights and rate of flood travel in the James River, have been given in this report in pursuance of a plan which has for its end the collection and preservation in a permanent and accessible form of all matter relating to the floods of this stream. In previous annual reports some space has been devoted to an elementary consideration of the same subject, and the data now given are only to be considered as supplementary thereto.

Freshet record of James River, May 4, 1893, to October 2, 1896.

Date.	Highest stages of river (feet and tenths) during freshets.								Richmond at Rocketts.
	Cliftonforge.	Eagle Mountain.	Buchanan.	Balcony Falls.	Lynchburg.	Scottsville.	Columbia.	9-Mile Locks.	
1893.									
Time...	10.30 a.m.	11 a.m.	11 a.m.	5.30 p.m.	6.30 p.m.	12 midn't	1 a.m.	3 p.m.	4 p.m.
May 4....	10.5	12.3	15.0	13.3	13.9	17.8	26.9	10.1	16.9
May 5....									
Time...	4 p.m.	4 p.m.	8 a.m.	4 p.m.	6 p.m.	6 a.m.	7 a.m.	1 a.m.	2 a.m.
Sept. 12..	2.0	3.9							
Sept. 13..			7.7	7.0	10.8				
Sept. 14..						14.9	24.0		
Sept. 15..							8.1		14.6
1895.									
Time...					8 p.m.	8 a.m.	4 p.m.	2 p.m.	5 p.m.
Jan. 10...					10.5				
Jan. 11...						18.4	28.3		
Jan. 12...							10.7		18.2
Time...	8 p.m.		12 midn't	12 midn't	2 a.m.	7 p.m.	8 a.m.	6 p.m.	8 p.m.
Apr. 8....	15.9		19.0	11.0					
Apr. 9....					15.2	19.2			
Apr. 10...							25.5	9.4	16.4
Time...	8 a.m.	4 p.m.	4 p.m.				4 p.m.	2 p.m.	5 p.m.
July 9....	9.0	9.0	12.1		10.2				
July 10...						14.2	19.3		
July 11...							7.4		12.5
18.6.									
Time...					10 p.m.		10 a.m.	1 a.m.	4 a.m.
Sept. 30..					15.7				
Oct. 1....							28.5		
Oct. 2....								10.3	16.7

NOTE.—None of the heights given in this table are referred to the Weather Bureau river gages. Data given have not been verified.

It is unfortunate that the importance of preserving detailed information of each flood was not recognized many years before it appears to have been, and that when recognized a more determined effort was not made to keep it complete from year to year. Work of this nature is necessarily largely voluntary work, and hence the thoroughness of its performance depends upon the amount of personal interest each cooperating individual has. It is, doubtless, owing to the importance of the work being not understood that the record at a number of points is of so fragmentary a nature as to be well nigh useless for the purposes of reference or study. But nevertheless it is given, not only to preserve it in whatever measure of completeness it does possess, but also in the hope that at some future day it may be added to by some more successful person.

Comparison of Freshets.

Place.	Date.	Time.	Height, in feet.	Excess above, May 5.		Interval, Columbia to Richmond.
				Columbia.	Richmond.	
Columbia	May 5, 1893...	1 a. m.	26.9	Feet. 0.00	Feet.	Hrs. 15
Richmond	do	4 p. m.	16.9	.....	0.00	.....
Columbia	Sept. 14, 1893.	7 a. m.	24.0	-2.90	.....	19
Richmond	Sept. 15, 1893.	2 a. m.	14.6	.....	-2.27	.....
Columbia	Jan. 11, 1895..	4 p. m.	28.3	+1.40	.....	25
Richmond	Jan. 12, 1895..	5 p. m.	18.2	.....	+1.29	.....
Columbia	April 10, 1895.	8 a. m.	25.5	-1.40	.....	12
Richmond	do	8 p. m.	16.4	.....	-0.52	.....
Columbia	July 10, 1896..	4 p. m.	19.3	-7.60	.....	25
Richmond	July 11, 1896..	5 p. m.	12.5	.....	-4.38	.....
Columbia	Oct. 1, 1896..	10 a. m.	29.5	+1.60	.....	18
Richmond	Oct. 2, 1896..	4 a. m.	16.7	.....	-0.20	.....

Place.	Date.	Time.	Height, in feet.	Excess above, May 4, Lynchburg.	Excess above, May 5, Richmond.	Interval, Lynchburg to Richmond.
Richmond	May 5, 1893...	4:00 p. m.	16.9	.....	0.00	21.5
Lynchburg	Sept. 13, 1893.	6:00 p. m.	10.8	-3.10	.....	32
Richmond	Sept. 15, 1893.	2:00 a. m.	14.6	.....	-2.27	.....
Lynchburg	Jan. 10, 1895..	8:00 p. m.	10.5	-3.40	.....	45
Richmond	Jan. 12, 1895..	5:00 p. m.	18.2	.....	+1.29	.....
Lynchburg	April 9, 1895..	2:00 a. m.	15.2	+1.30	.....	42
Richmond	April 10, 1895.	8:00 p. m.	16.4	.....	-0.52	.....
Lynchburg	July 9, 1896..	8:00 p. m.	10.2	-3.70	.....	45
Richmond	July 11, 1896..	5:00 p. m.	12.5	.....	-4.38	.....
Lynchburg	Sept. 30, 1896	10:00 p. m.	15.7	+1.80	.....	30
Richmond	Oct. 2, 1896..	4:00 a. m.	16.7	.....	-0.20	.....

Height given at Richmond is above mean low tide, which is 10.179 feet above the United States Engineer datum. Height given at all other points is above ordinary low water known or assumed.

Rise at Richmond is 59 to 65 per cent of that at Columbia. Difference in time of maximum rise at Columbia and Richmond is twelve to twenty-five hours.

Rise at Richmond is 65 to 73 per cent greater than at Lynchburg. Difference in time of maximum rise at Lynchburg and Richmond is twenty-one and a half to forty-five hours.

The Weather Bureau, by the thoroughness of its methods, has solved many fluvial problems, and has perfected a flood warning system that is of immense value to the people in times of high water. A notable instance of this may be found in the great flood occurring in the lower Mississippi Valley in the spring of 1897, when all forecasts of expected flood heights were verified on the days named with astonishing accuracy. Truly, if the guarantee for the future lies in the progress of the past, we shall at no distant day find in this a work of noble and impressive proportions.

In the Richmond district the Chief of the Weather Bureau has authorized the establishment of two additional special rainfall reporting stations during the year, viz, Buena Vista and Cliftonforge.

Table of flood rises in James River from September, 1870, to January, 1892.

Date.	Lexington. (198.5 miles.)	Cliftonforge. (230.2 miles.)	Balcony Falls. (174.4 miles.)	Lynchburg. (146.6 miles.)	Joshua Falls. (135.9 miles.)	Allens Creek. (120.3 miles.)	Greenway. (144.0 miles.)	Midway Mills. (101.9 miles.)	Howardsville. (91.0 miles.)	Scottsville. (79.3 miles.)
September, 1870				14.4			31.0	28.4	25.5	28.8
November, 1870				11.8					26.3	
March 10, 1874				9.9		9.9			14.0	
March 27, 1884			10.0	12.2					17.8	
October 30, 1885	8.0	8.7	12.2							
October 31, 1885				13.0						
November 1, 1885			10.2							16.3
January 4, 1886		11.0		14.2						
January 5, 1886										17.0
April, 1886	12.2		11.2				21.4	21.0	21.6	22.5
July, 1886				10.8						
August, 1889										
April, 1891										
January, 1892										
September 30, 1870			25.0†	26.0†						
November 27, 1870			24.0†	25.0†						

Table of flood rises in the James River, etc.—Continued.

Date.	Middleton Mills. (70.1 miles.)	Bremo Bluff. (68.4 miles.)	Columbia. (56.5 miles.)	Irwin. (33.4 miles.)	Maidens Adventure. (30.8 miles.)	Lee. (24.4 miles.)	Vinita. (15.3 miles.)	Nine Mile Locks.	Three Mile Locks.	Richmond.
September, 1870	23.2	30.7	36.6							27.0*
November, 1877	24.2	28.2	36.1	31.4	21.0			15.8	8.1	28.6*
March 10, 1874			20.0							18.7
March 27, 1884			24.0							15.7
October, 30, 1885										
October 31, 1885			30.6							15.9
November 1, 1885			30.6							14.2
January 4, 1886										
January 5, 1886			24.0							14.8
April, 1886	19.9	24.0	29.8	24.4	19.9	19.7	21.7	12.1	7.1	24.3
July, 1886			23.8							17.2
August, 1889			29.5							22.5
April, 1891			20.5							14.4
January 1892			20.3							13.5
September 30, 1870			39.0†							24.0†
November 27, 1870			37.5†							23.5†

* From records of James River Improvement Office through C. P. E. Burgwyn, other information through T. C. Eggleston and A. D. Frethan, from records of R. and A. R. R. Co.
 † From records of R. and A. R. R. Co., Col. W. R. Munford, custodian.
 The distances in miles given in headings are above Richmond.
 Readings given are above mean low tide level at Richmond, and ordinary stages of the river at all other points given. The exact date on which the maximum rise occurred at each place is not recorded.

TABLE I.—Annual climatological summary, Weather Bureau Stations, 1900.

Table with columns: Districts and stations, Elevation of barometer above sea level, Pressure in inches (Mean actual, Mean reduced, Departure from normal), Temperature of the air in degrees Fahrenheit (Mean max, Mean min, Annual range), Mean temperature of the dew-point, Mean relative humidity, Precipitation (Total, Departure from normal, Days with .01 or more), Winds (Total movement, Prevailing direction, Max. velocity), Clear days, Partly cloudy days, Cloudy days, Average cloudiness, Total snowfall.

TABLE I.—Annual climatological summary, Weather Bureau stations, 1900—Continued.

Districts and stations.	Elevation of barometer above sea level.	Pressure in inches.†			Temperature of the air, in degrees Fahrenheit.							Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation.			Winds.			Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Total snowfall, in inches.‡
		Mean actual, 8 a. m. to 8 p. m. + 2.	Mean reduced.	Departure from normal.	Mean max. + mean min. + 2.	Departure from normal.	Maximum.	Mean maximum.	Minimum.	Mean minimum.	Annual range.			Total, in inches.	Departure from normal.	Days with .01, or more.	Total movement, miles.	Prevailing direction.	Miles, per hour.						Max. velocity.
<i>Upper Miss. Val.—Con.</i>																								
Des Moines, Iowa.....	861	29.11	30.05	+ .03	50.7	+ 2.2	95	60	- 10	41	105	43	75	38.46	+ 5.85	98	71,994	sw.	44	109	149	107	5.5	18.9
Dubuque, Iowa.....	698	29.27	30.03	+ .01	49.4	+ 1.6	95	56	- 13	40	108	40	75	38.43	+ 2.10	118	66,091	nw.	42	145	123	97	4.6	35.6
Keokuk, Iowa.....	614	29.37	30.03	+ .01	53.5	+ 2.1	97	62	- 4	44	102	43	75	38.61	+ 1.11	104	66,737	nw.	48	171	107	87	4.2	21.1
Cairo, Ill.....	356	29.67	30.06	+ .02	59.6	+ 1.9	98	68	- 4	51	97	50	77	36.89	+ 5.94	122	68,231	s.	45	90	164	111	5.6	9.8
Springfield, Ill.....	644	29.35	30.04	.00	54.2	+ 1.9	97	63	- 4	45	101	43	72	30.36	+ 7.65	117	80,609	s.	44	131	136	98	5.0	35.6
Hannibal, Mo.....	534	29.43	30.04	.00	54.5	+ 2.0	99	64	- 2	45	101	43	72	29.16	+ 2.80	109	79,337	sw.	48	162	111	92	4.4	29.2
St. Louis, Mo.....	567	29.43	30.04	.00	53.3	+ 2.7	99	64	- 1	50	98	47	72	29.51	+ 1.57	103	85,303	s.	59	146	108	111	4.9	15.9
<i>Missouri Valley.</i>																								
Columbia, Mo.....	784	29.01	30.04	+ .02	55.4	+ 1.0	100	66	- 4	44	104	43	70	36.00	+ 3.33	118	70,553	s.	40	124	112	129	5.4	38.1
Kansas City, Mo.....	963	29.01	30.04	+ .02	55.8	+ 2.6	98	65	- 1	47	99	44	70	35.78	+ 0.56	102	72,757	se.	42	159	90	116	4.6	25.5
Springfield, Mo.....	1,324	28.63	30.03	.00	56.9	+ 2.0	96	65	- 8	48	104	47	76	42.72	+ 3.00	122	66,353	se.	63	159	125	81	4.5	11.5
Topeka, Kans.....	1,189	28.72	29.99	- .04	52.7	+ 2.6	100	63	- 1	45	102	41	74	30.81	+ 3.59	97	76,393	s.	73	169	100	96	4.8	30.8
Lincoln, Nebr.....	1,105	28.82	30.00	- .05	52.5	+ 2.9	97	62	- 9	43	106	42	74	31.20	+ 0.49	87	70,435	se.	45	148	100	96	4.4	13.3
Omaha, Nebr.....	2,598	27.37	29.99	- .05	49.5	+ 3.2	102	62	- 21	37	123	34	66	22.23	+ 3.08	90	66,435	nw.	70	148	137	80	4.8	10.1
Valentine, Nebr.....	1,185	28.31	29.99	- .04	49.6	+ 3.5	97	59	- 12	48	109	41	74	31.38	+ 8.72	92	118,036	nw.	70	169	109	109	4.6	14.5
Sioux City, Iowa.....	1,572	28.31	29.99	- .04	49.8	+ 4.4	110	62	- 15	38	125	32	57	16.81	+ 3.70	80	96,252	se.	60	145	110	104	4.8	21.1
Pierre, S. Dak.....	1,306	28.58	30.00	- .04	48.6	+ 4.3	103	59	- 20	34	123	35	71	24.79	+ 3.70	87	105,734	se.	60	164	180	71	4.4	17.3
Huron, S. Dak.....	1,293	28.58	30.00	- .04	50.1	+ 4.3	100	61	- 12	39	112	37	65	21.79	+ 4.56	90	82,165	se.	54	145	125	95	4.5	14.5
Yankton, S. Dak.....	2,505	27.31	29.97	- .04	47.4	+ 3.5	108	57	- 37	32	145	32	62	12.79	+ 1.58	85	90,900	sw.	50	161	148	56	4.6	98.1
<i>Northern Slope.</i>																								
Havre, Mont.....	2,371	27.43	29.93	- .09	48.0	+ 4.4	110	61	- 16	36	126	38	67	10.55	+ 2.16	85	97,098	sw.	54	204	108	53	3.7	16.0
Miles City, Mont.....	4,110	25.79	30.00	- .03	46.0	+ 3.9	102	56	- 23	36	125	38	56	11.62	+ 1.56	79	67,282	sw.	58	92	128	145	5.7	58.1
Helena, Mont.....	2,965	26.91	30.02	- .02	44.3	+ 3.2	92	54	- 19	34	111	31	32	17.69	+ 1.33	116	50,451	nw.	37	105	116	144	4.4	33.7
Kalispell, Mont.....	3,234	25.57	29.91	- .10	49.4	+ 3.4	106	61	- 18	38	124	39	60	13.32	+ 3.39	81	69,908	nw.	46	174	125	66	4.2	34.3
Rapid City, S. Dak.....	6,088	23.99	29.99	- .02	46.4	+ 3.0	92	59	- 18	34	110	24	50	16.09	+ 3.89	84	93,318	nw.	54	146	159	60	4.3	70.1
Cheyenne, Wyo.....	5,372	24.63	30.02	- .01	44.9	+ 2.7	96	60	- 30	30	126	27	50	14.23	+ 0.78	61	35,313	sw.	52	147	147	71	4.5	65.6
Lander, Wyo.....	2,821	27.07	30.01	- .01	51.2	+ 3.9	100	64	- 11	39	111	37	65	23.04	+ 0.71	69	79,049	w.	49	169	145	51	4.4	17.9
North Platte, Nebr.....	5,291	24.72	30.00	+ .01	51.9	+ 2.5	97	65	- 19	38	116	27	48	15.29	+ 0.80	64	72,511	s.	53	188	125	52	4.6	49.5
<i>Middle Slope.</i>																								
Denver, Colo.....	4,685	25.27	29.97	- .01	52.5	+ 1.4	100	67	- 16	38	116	29	50	13.37	+ 1.26	60	58,917	nw.	48	203	180	32	3.7	25.2
Pueblo, Colo.....	1,398	28.53	30.01	- .03	55.3	+ 3.1	104	66	- 4	45	108	43	72	25.54	+ 0.05	91	67,514	s.	35	144	144	47	4.7	11.8
Concordia, Kans.....	2,509	27.88	29.98	- .02	56.1	+ 3.0	104	69	- 6	43	110	42	70	20.76	+ 0.92	73	96,600	se.	49	193	124	48	4.0	26.8
Dodge, Kans.....	1,358	28.58	30.01	+ .01	57.4	+ 2.0	104	67	- 1	48	105	45	70	31.85	+ 3.08	86	75,884	s.	39	158	113	94	4.6	22.1
Wichita, Kans.....	1,214	28.71	30.00	.00	60.4	+ 0.7	98	70	- 5	50	93	48	71	31.45	+ 1.84	85	88,278	s.	50	146	102	117	4.0	4.3
Oklahoma, Okla.....	1,798	28.18	29.99	- .02	64.4	+ 1.0	105	75	- 14	54	91	48	64	25.26	+ 6.65	67	79,988	se.	58	180	115	70	4.2	5.5
Abilene, Tex.....	3,776	26.24	29.98	- .02	56.3	+ 1.5	98	68	- 1	44	97	41	64	24.40	+ 0.21	84	133,891	s.	64	201	94	70	4.2	12.9
Amarillo, Tex.....	3,762	26.15	29.93	- .02	64.2	+ 0.8	103	78	- 17	50	86	31	39	7.95	+ 1.33	48	86,912	nw.	55	205	130	30	3.0	1.5
<i>Southern Slope.</i>																								
El Paso, Tex.....	7,013	23.26	29.97	- .02	50.5	+ 2.2	89	61	- 7	40	83	22	42	15.89	+ 1.64	42	85,149	se.	44	226	107	32	3.1	27.4
Santa Fe, N. Mex.....	1,108	28.74	29.99	- .05	70.7	+ 1.6	112	85	- 22	56	90	34	33	5.39	+ 1.82	19	36,980	e.	40	256	72	37	2.5	2.5
Phoenix, Ariz.....	141	29.69	29.93	- .06	72.1	+ 0.1	112	87	- 31	57	81	40	38	0.85	+ 2.12	10	53,148	w.	42	107	107	17	1.4	0.4
Yuma, Ariz.....	3,910	25.95	29.98	- .06	59.3	+ 0.7	100	72	- 15	47	85	21	28	4.22	+ 1.52	36	73,977	nw.	66	248	100	17	2.1	0.4
Indepence, Cal.....	4,720	25.26	30.01	+ .02	50.5	+ 0.9	95	64	- 6	37	89	29	50	7.05	+ 4.91	47	58,806	w.	60	154	123	83	4.4	28.6
<i>Middle Plateau.</i>																								
Carson City, Nev.....	4,344	25.66	30.03	+ .03	49.4	+ 0.8	98	63	- 4	36	94	26	49	7.41	+ 1.05	43	80,190	sw.	60	143	90	132	5.2	20.1
Winnemucca, Nev.....	5,850	24.26	30.01	- .03	52.9	+ 0.8	95	63	- 7	42	88	21	38	8.44	+ 1.33	56	56,492	se.	36	187	93	74	3.7	41.8
Cedar City, Utah.....	4,366	25.61	30.00	- .03	53.8	+ 2.5	101	64	- 2	44	99	29	47	11.53	+ 4.66	62	51,337	se.	60	217	81	67	3.4	32.7
Salt Lake City, Utah.....	4,608	25.37	29.99	- .03	51.5	+ 2.5	104	68	- 8	41	101	23	39	3.64	+ 4.86	51	46,880	se.	41	172	122	71	4.0	8.5
Grand Junction, Colo.....	3,471	26.44	30.03	- .02	47.3	+ 2.4	95	57	- 1	38	96	31	62	13.84	+ 1.31	116	51,100	s.	50	94	81	190	6.4	37.8
<i>Northern Plateau.</i>																								
Baker City, Oreg.....	2,739	27.17	30.02	- .02	52.5	+ 1.8	104	64	- 11	41	93	34	58	12.77	+ 1.65	78	39,440	nw.	55	138	123	104	4.4	12.9
Boise, Idaho.....	4,482	25.47	30.00	- .05	49.3	+ 3.9	100	61	- 15	38	115	30	58	9.35	+ 5.92	81	90,224	s.	48	157	85	133	5.0	36.0
Pocatello, Idaho.....	1,943	27.96	30.02	- .00	49.8	+ 2.0	100	59	- 10	40	110	35	66	18.72	+ 0.47	124	52,304	sw.	48	86	86	213	6.9	19.2
Spokane, Wash.....	1,000	28.94	30.01	- .03	54.4	+ 1.2	102	64	- 2	45	104	44	74	18.89	+ 2.12	117	49,500	s.	35	136	147	82	4.8	15.8
Walla Walla, Wash.....	50	29.94	30.00	- .02	49.2	+ 0.4	73	54	- 18	45	55	4												

TABLE II.—Annual climatological summary, Canadian stations, 1900.

Table with 10 columns: Stations, Pressure (Mean not reduced, Mean reduced, Departure from normal), Temperature (Mean, Departure from normal, Mean maximum, Mean minimum), Precipitation (Total, Departure from normal), Total depth of snow-fall. Rows include St. Johns, N. F., Sydney, C. B. I., Halifax, N. S., Grand Manan, N. B., Yarmouth, N. S., Charlottetown, P. E. I., Chatham, N. B., Father Point, Que., Quebec, Que., Montreal, Que., Blissett, Ont., Ottawa, Ont., Toronto, Ont., White River, Ont., Port Stanley, Ont., Saugeen, Ont., Farry Sound, Ont., Port Arthur, Ont., Winnipeg, Man., Minnedosa, Man., Qu'Appelle, Assin., Medicine Hat, Assin., Swift Current, Assin., Calgary, Alberta, Banff, Alberta, Edmonton, Alberta, Prince Albert, Sask, Battleford, Sask, Kamloops, B. C., Victoria, B. C., Barkerville, B. C., Hamilton, Bermuda.

* Reduced to standard gravity. † For the snow year, July 1, 1899, to June 30, 1900

TABLE III.—Reduction data for 1900.—Continued.

Table with 9 columns: Stations, Elevation, Mean observed pressure, Mean observed temperature, Mean dew-point, Mean reduction temperature, Mean pressure reduced to sea level, Mean temperature reduced to sea level, Mean pressure at 10,000 feet altitude. Rows include Ohio Valley and Tennessee (Chattanooga, Knoxville, Memphis, Nashville, Louisville, Indianapolis, Cincinnati, Columbus, Pittsburg, Parkersburg), Lower Lake Region (Buffalo, Oswego, Rochester, Erie, Cleveland, Sandusky, Toledo, Detroit), Upper Lake Region (Alpena, Escanaba, Grand Haven, Marquette, Port Huron, Sault Ste. Marie, Chicago, Milwaukee, Duluth), North Dakota (Moorhead, Bisbee, Williston), Upper Mississippi Valley (St. Paul, Davenport, Des Moines, Dubuque, Keokuk, Cairo, Springfield, St. Louis), Missouri Valley (Kansas City, Springfield, Lincoln, Omaha, Valentine, Pierre, Huron), Northern Slope (Havre, Miles City, Helena, Kalispell, Rapid City, Cheyenne, Lander, North Platte), Middle Slope (Denver, Pueblo, Concordia, Dodge, Wichita, Oklahoma), Southern Slope (Abilene, Amarillo, El Paso, Santa Fe, Phoenix, Yuma, Independence), Middle Plateau (Carson City, Winnemucca, Cedar City, Salt Lake City, Grand Junction), Northern Plateau (Baker City, Boise, Pocatello, Spokane, Walla Walla), North Pacific Coast (Neah Bay, Seattle, Portland, Roseburg), Middle Pacific Coast (Eureka, Red Bluff, Sacramento, San Francisco).

TABLE III.—Reduction data for 1900.

Table with 9 columns: Stations, Elevation, Mean observed pressure, Mean observed temperature, Mean dew-point, Mean reduction temperature, Mean pressure reduced to sea level, Mean temperature reduced to sea level, Mean pressure at 10,000 feet altitude. Rows include New England States (Eastport, Portland, Northfield, Boston, Nantucket, Block Island, New Haven), Middle Atlantic States (Albany, New York, Philadelphia, Atlantic City, Baltimore, Washington, Lynchburg, Norfolk), South Atlantic States (Charlotte, Hatteras, Raleigh, Wilmington, Charleston, Augusta, Savannah, Jacksonville), Florida Peninsula (Jupiter, Key West, Tampa), East Gulf States (Atlanta, Mobile, Montgomery, Vicksburg, New Orleans), West Gulf States (Shreveport, Fort Smith, Little Rock, Corpus Christi, Galveston, Palestine, San Antonio).

TABLE III.—Reduction data for 1900—Continued.

Stations.	Elevation.	Mean observed pressure.	Mean observed temperature.	Mean dew-point.	Mean reduction temperature.	Mean pressure reduced to sea level.	Mean temperature reduced to sea level.	Mean pressure at 10,000 feet altitude.
	Feet.	Inches.	° F.	° F.	° F.	Inches.	° F.	Inches.
<i>South Pacific Coast.</i>								
Fresno, Cal.	330	29.61	62.8	43	60.6	29.96	60.9	20.79
Los Angeles, Cal.	338	29.60	63.5	50	63.5	29.95	63.8	20.83
San Diego, Cal.	87	29.85	62.0	51	64.5	29.95	64.6	20.85
San Luis Obispo, Cal.	201	29.79	60.2	47	60.4	30.01	60.6	20.83
<i>Canadian Stations.</i>								
St. Johns, N. F.	125	29.72	40.8	...	40.9	29.87	41.0	20.41
Sydney, C. B. I.	35	29.90	43.1	...	43.2	29.94	43.3	20.50
Halifax, N. S.	97	29.85	45.6	...	45.7	29.96	45.8	20.55
Grand Manan, N. B.	49	29.91	44.6	...	44.6	29.96	44.6	20.54
Yarmouth, N. S.	65	29.90	45.0	...	45.1	29.98	45.2	20.56
Charlottetown, P. E. I.	38	29.89	43.4	...	43.4	29.93	43.4	20.50
Chatham, N. B.	21	29.91	40.2	...	40.2	29.93	40.2	20.44
Father Point, Que.	20	29.90	35.1	...	35.1	29.93	35.1	20.37
Quebec, Que.	296	29.63	39.5	...	39.8	29.97	40.1	20.46
Montreal, Que.	187	29.77	42.8	...	43.0	29.98	43.2	20.52
Bissett, Ont.	557	29.40	38.7	...	39.2	30.02	39.7	20.49
Ottawa, Ont.	294	29.64	43.0	...	43.3	29.96	43.6	20.52
Kingston, Ont.	285	29.68	44.9	...	45.2	30.00	45.5	20.57
Toronto, Ont.	350	29.63	47.3	...	47.7	30.01	48.0	20.61
White River, Ont.	1,252	28.64	34.1	...	36.5	30.02	37.8	20.44
Port Stanley, Ont.	592	29.33	46.7	...	47.3	30.02	47.9	20.62
Saugeen, Ont.	656	29.29	45.0	...	45.7	30.02	46.4	20.59
Parry Sound, Ont.	685	29.29	43.1	...	43.7	30.00	44.3	20.54
Port Arthur, Ont.	644	29.27	37.8	...	37.8	29.99	38.4	20.44
Winnipeg, Man.	760	29.17	36.9	...	37.7	30.02	38.5	20.47
Minnedosa, Man.	1,690	28.15	36.5	...	39.0	30.00	40.7	20.48
Qu'Appelle, Assin.	2,115	27.67	36.4	...	39.7	29.96	40.8	20.44
Medicine Hat, Assin.	2,161	27.64	43.6	...	45.2	29.95	47.4	20.54
Swift Current, Assin.	2,440	27.38	40.0	...	41.7	29.99	44.1	21.50
Calgary, Alberta.	3,889	26.35	38.6	...	42.0	29.91	45.4	20.47
Edmonton, Alberta.	2,158	27.58	37.8	...	40.9	29.90	43.1	20.44
Prince Albert, Sask.	1,432	28.37	39.2	...	35.5	29.92	36.9	20.37
Battleford, Sask.	1,620	28.20	34.9	...	36.7	29.98	38.3	20.42
Kamloops, B. C.	1,193	28.74	48.3	...	47.0	30.02	48.2	20.61
Victoria, B. C.	85	29.91	50.7	...	50.7	30.01	50.7	20.66
Barkerville, B. C.	4,180	25.57	37.6	...	40.2	29.91	44.4	20.43
Hamilton, Bermuda.	151	29.92	69.9	...	70.1	30.08	70.3	21.03

TABLE IV.—Resultant winds—Continued.

Stations.	Component direction from—				Resultant.	
	N.	S.	E.	W.	Direction from—	Duration.
<i>Western Gulf States—Con'd.</i>						
Fort Worth, Tex.	104	189	85	114	° s. 21 w.	85
Galveston, Tex.	160	305	304	196	° s. 51 e.	230
Palestine, Tex.	184	384	187	112	° s. 22 e.	215
San Antonio, Tex.	248	242	258	65	n. 87 e.	190
<i>Ohio Valley and Tennessee.</i>						
Chattanooga, Tenn.	205	268	176	257	° s. 53 w.	100
Knoxville, Tenn.	376	306	180	255	n. 49 w.	11
Memphis, Tenn.	215	287	220	166	° s. 36 e.	9
Nashville, Tenn.	223	253	189	237	° s. 58 w.	87
Lexington, Ky.	77	164	106	104	° s. 1 e.	88
Louisville, Ky.	232	287	137	220	° s. 53 w.	100
Evansville, Ind.	109	138	113	82	° s. 46 e.	43
Indianapolis, Ind.	248	240	156	249	n. 84 w.	91
Cincinnati, Ohio.	217	247	236	228	° s. 15 e.	100
Columbus, Ohio.	193	241	189	284	° s. 53 w.	19
Pittsburg, Pa.	270	100	135	309	n. 65 w.	122
Parkersburg, W. Va.	219	279	133	235	° s. 55 w.	184
Elkins, W. Va.	247	210	95	289	n. 78 w.	23
<i>Lower Lake Region.</i>						
Buffalo, N. Y.	156	242	135	240	° s. 66 w.	11
Oswego, N. Y.	151	212	190	260	° s. 56 w.	189
Rochester, N. Y.	166	265	120	277	° s. 58 w.	210
Erie, Pa.	162	151	120	230	n. 87 w.	189
Cleveland, Ohio.	161	323	206	216	° s. 32 w.	149
Sandusky, Ohio.	144	358	195	293	° s. 42 w.	144
Toledo, Ohio.	169	244	179	299	° s. 56 w.	144
Detroit, Mich.	194	233	183	311	° s. 77 w.	138
<i>Upper Lake Region.</i>						
Alpena, Mich.	246	216	159	299	n. 78 w.	143
Escanaba, Mich.	256	204	102	256	° s. 66 w.	150
Grand Haven, Mich.	224	319	212	235	n. 41 w.	20
Marquette, Mich.	253	221	114	331	n. 76 w.	124
Port Huron, Mich.	132	266	121	257	° s. 45 w.	198
Saint Ste. Marie, Mich.	163	197	305	268	° s. 5 w.	841
Chicago, Ill.	205	242	213	235	° s. 49 w.	56
Milwaukee, Wis.	220	196	165	232	n. 72 w.	63
Green Bay, Wis.	217	276	141	220	° s. 53 w.	100
Duluth, Minn.	339	146	205	278	n. 20 w.	20
<i>North Dakota.</i>						
Moorhead, Minn.	248	256	238	215	° s. 83 e.	23
Bismarck, N. Dak.	298	158	237	206	n. 12 e.	14
Williston, N. Dak.	293	207	196	230	n. 42 w.	120
<i>Upper Mississippi Valley.</i>						
St. Paul, Minn.	209	275	179	243	° s. 41 w.	92
La Crosse, Wis.	107	172	63	85	° s. 18 w.	63
Davenport, Iowa.	173	209	218	290	° s. 60 w.	81
Des Moines, Iowa.	230	255	222	214	° s. 18 e.	26
Dubuque, Iowa.	190	262	189	256	° s. 45 w.	94
Keokuk, Iowa.	201	260	189	256	° s. 53 w.	100
Cairo, Ill.	234	300	198	163	° s. 16 e.	73
Springfield, Ill.	190	273	179	298	n. 37 w.	100
Hannibal, Mo.	93	131	101	124	° s. 32 w.	44
St. Louis, Mo.	222	275	171	186	° s. 32 w.	54
<i>Missouri Valley.</i>						
Columbia, Mo.	103	125	120	99	° s. 44 e.	30
Kansas City, Mo.	233	282	233	159	° s. 54 e.	100
Springfield, Mo.	191	227	223	146	° s. 63 e.	69
Lincoln, Nebr.	221	307	207	126	n. 10 e.	110
Omaha, Nebr.	229	165	267	157	n. 61 e.	125
Valentine, Nebr.	244	223	134	230	n. 83 w.	161
Sioux City, Iowa.	113	148	105	91	° s. 22 e.	38
Pierre, S. Dak.	238	213	277	176	n. 79 w.	10
Huron, S. Dak.	225	229	263	211	° s. 85 e.	52
Yankton, S. Dak.	99	98	93	137	n. 89 w.	44
<i>Northern Slope.</i>						
Havre, Mont.	208	169	173	369	n. 79 w.	200
Miles City, Mont.	142	281	59	435	° s. 81 w.	385
Helena, Mont.	216	292	104	395	° s. 88 w.	290
Kalspell, Mont.	172	175	178	398	° s. 88 w.	120
Rapid City, S. Dak.	281	190	83	342	n. 71 w.	275
Cheyenne, Wyo.	173	310	157	310	° s. 47 w.	205
Lander, Wyo.	192	247	186	256	° s. 51 w.	90
<i>Middle Slope.</i>						
Denver, Colo.	204	319	147	209	° s. 27 w.	184
Pueblo, Colo.	268	143	239	266	n. 14 e.	124
Concordia, Kans.	182	353	175	123	° s. 16 e.	177
Dodge, Kans.	242	294	221	142	° s. 58 e.	94
Wichita, Kans.	226	364	176	82	° s. 33 e.	166
Oklahoma, Okla.	205	363	189	85	° s. 32 e.	189
<i>Southern Slope.</i>						
Abilene, Tex.	183	167	277	139	° s. 84 e.	139
Amarillo, Tex.	180	374	152	181	° s. 9 w.	19
<i>Southern Plateau.</i>						
El Paso, Tex.	228	95	255	320	n. 27 w.	184
Santa Fe, N. Mex.	223	255	300	114	° s. 81 e.	191
Phoenix, Ariz.	168	95	290	297	n. 6 w.	73
Yuma, Ariz.	252	223	186	321	n. 81 w.	182
<i>Middle Plateau.</i>						
Carson City, Nev.	189	225	115	351	° s. 81 w.	248
Winnemucca, Nev.	227	211	109	258	n. 68 w.	54
Cedar City, Utah.	234	374	234	163	° s. 16 e.	260
Salt Lake City, Utah.	257	243	210	208	n. 8 e.	14
Grand Junction, Colo.	123	209	284	207	° s. 42 e.	120
<i>Northern Plateau.</i>						
Baker City, Oreg.	196	380	139	150	° s. 31 w.	180
Boise, Idaho.	223	211	199	294	n. 77 w.	98
Pocatello, Idaho.	130	351	115	252	° s. 49 w.	185
Spokane, Wash.	154	324	197	208	° s. 3 w.	170
Walla Walla, Wash.	96	444	113	241	n. 20 w.	373
<i>North Pacific Coast Region.</i>						
Neah Bay, Wash.	62	208	241	331	° s. 51 w.	18
Port Crescent, Wash.	16	77	120	205	° s. 55 w.	104

TABLE IV.—Resultant winds from observations at 8 a. m. and 8 p. m., daily, during the year 1900.

Stations.	Component direction from—				Resultant.	
	N.	S.	E.	W.	Direction from—	Duration.
<i>New England.</i>						
Eastport, Me.	232	176	117	342	n. 72 w.	23
Portland, Me.	244	213	89	347	n. 63 w.	262
Northfield, Vt.	253	482	44	107	° s. 15 w.	238
Boston, Mass.	212	191	113	354	° s. 85 w.	24
Nantucket, Mass.	246	222	139	315	n. 84 w.	181
Block Island, R. I.	192	207	159	362	° s. 84 w.	20
New Haven, Conn.	306	184	130	289	n. 36 w.	272
<i>Middle Atlantic States.</i>						
Albany, N. Y.	242	285	69	237	n. 77 w.	175
Binghamton, N. Y.	156	79	29	177	n. 60 w.	161
New York, N. Y.	238	200	158	304	n. 75 w.	14
Harrisburg, Pa.	114	71	77	160	n. 62 w.	47
Philadelphia, Pa.	249	209	156	291	n. 41 w.	52
Atlantic City, N. J.	226	218	146	308	° s. 87 w.	170
Baltimore, Md.	300	198	200	276		

TABLE IV.—Resultant winds—Continued.

Table with columns: Stations, Component direction from (N, S, E, W), Resultant (Direction from, Duration), and Hours. Rows include North Pacific Coast Region, Middle Pacific Coast Region, South Pacific Coast Region, West Indies, and Willemstad, Curaçao.

* From observations at 8 p. m. only. † From observations at 8 a. m. only.

TABLE V.—Total number of days with thunderstorms at selected stations, 1900.

Table with columns: State and station, and months from January to December, plus Annual. Rows are organized by state/region: Alabama, Arizona, Arkansas, California, Colorado, Connecticut, Dist. of Columbia, Florida, Georgia, Idaho, and Missouri.

TABLE V.—Total number of days with thunderstorms, etc.—Continued.

Table with columns: State and station, and months from January to December, plus Annual. Rows continue from the previous table, including Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, and Whiteoaks.

TABLE V.—Total number of days with thunderstorms, etc.—Continued.

Table with columns for State and station, and months from January to December, plus an Annual total. Rows include states like New York, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, and Wyoming.

TABLE VI.—Number of days on which thunderstorms were reported, 1900.

Table with columns for States, and months from January to December, plus an Annual total. Rows include states like Alabama, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, Florida, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, and Wyoming.

TABLE VII.—Number of days on which auroras were reported, 1900.

Table with columns for States, and months from January to December, plus an Annual total. Rows include states like Alabama, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, Florida, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, and Pennsylvania.

TABLE VII.—Number of days on which auroras were reported, 1900—Con.

Table with 13 columns: States, January, February, March, April, May, June, July, August, September, October, November, December, Annual. Rows include Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, Wyoming, and a Total row.

Heights of rivers above zeros of gages, 1900—Continued.

Table with 6 columns: Stations, Highest water (Stage, Date), Lowest water (Stage, Date), Mean stage, Annual range. Rows include Muskingum River, Scioto River, Miami River, Wabash River, Licking River, Clinch River, Tennessee River, Cumberland River, Arkansas River, White River, Yazoo River, Red River, Ouachita River, Atchafalaya River, Susquehanna River, W. Br. of Susquehanna, Potomac River, James River, Roanoke River, Cape Fear River, Pedee River, Black River, Lynch Creek, Santee River, Congaree River, Wateree River, Waccamaw River, Savannah River, Broad River, Flint River, Chattahoochee River, Ocmulgee River, Oconee River, Coosa River, Alabama River, and Montgomery, Ala.

TABLE VIII.—Heights of rivers above zeros of gages, 1900.

Table with 6 columns: Stations, Highest water (Stage, Date), Lowest water (Stage, Date), Mean stage, Annual range. Rows include Mississippi River, St. Paul, Minn., Reads Landing, Minn., La Crosse, Wis., Prairie du Chien, Wis., Dubuque, Iowa, LeClaire, Iowa, Davenport, Iowa, Muscatine, Iowa, Galland, Iowa, Keokuk, Iowa, Hannibal, Mo., Grafton, Ill., St. Louis, Mo., Chester, Ill., Memphis, Tenn., Helena, Ark., Arkansas City, Ark., Greenville, Miss., Vicksburg, Miss., New Orleans, La., Missouri River, Bismarck, N. Dak., Pierre, S. Dak., Sioux City, Iowa, Omaha, Nebr., St. Joseph, Mo., Kansas City, Mo., Booneville, Mo., Hermann, Mo., Illinois River, Peoria, Ill., Youghiogheny River, Confluence, Pa., West Newton, Pa., Allegheny River, Warren, Pa., Oil City, Pa., Parker, Pa., Monongahela River, Weston, W. Va., Fairmont, W. Va., Greensboro, Pa., Lock No. 4, Pa., Conemaugh River, Johnstown, Pa., Red Bank Creek, Brookville, Pa., Beaver River, Ellwood Junction, Pa., Great Kanawha River, Charleston, W. Va., New River, Hinton, W. Va., Cheat River, Rowlesburg, W. Va., Ohio River, Pittsburg, Pa., Davis Island Dam, Pa., Wheeling, W. Va., Parkersburg, W. Va., Point Pleasant, W. Va., Huntington, W. Va., Catlettsburg, Ky., Portsmouth, Ohio, Cincinnati, Ohio, Madison, Ind., Louisville, Ky., Evansville, Ind., Paducah, Ky., and Cairo, Ill.

<i>Heights of rivers referred to zeros of gages, 1900—Continued.</i>							<i>Heights of rivers referred to zeros of gages, 1900—Continued.</i>						
Stations.	Highest water.		Lowest water.		Mean stage.	Annual range.	Stations.	Highest water.		Lowest water.		Mean stage.	Annual range.
	Stage.	Date.	Stage.	Date.				Stage.	Date.	Stage.	Date.		
<i>Tombigbee River.</i>							<i>Willamette River.</i>						
Columbus, Miss.....	Feet. 27.6	Apr. 19.....	Feet. -3.5	Oct. 8, 7.....	Feet. 4.7	Feet. 31.1	Albany, Oreg.....	Feet. 24.0	Jan. 15.....	Feet. 0.6	Aug. 29-30.....	Feet. 4.5	Feet. 23.4
Demopolis, Ala.....	68.7	Apr. 22.....	-0.9	Oct. 6, 7.....	19.9	89.6	Portland, Oreg.....	17.8	May 20.....	2.1	Oct. 17.....	8.2	15.7
<i>Black Warrior River.</i>							<i>Sacramento River.</i>						
Tuscaloosa, Ala.....	65.0	Apr. 18.....	0.2	Oct. 4.....	15.0	64.8	Red bluff, Cal.....	24.7	Jan. 3.....	-0.5	{ July 27-Sept. 8.. }	3.0	25.2
<i>Columbia River.</i>							Sacramento, Cal.....						
Umatilla, Oreg.....	20.0	May 15.....	-1.0	Aug. 29-31.....	7.7	21.0	Sacramento, Cal.....	27.0	Jan. 9.....	7.6	{ Sept. 18-Oct. 1.. }	14.8	19.4
The Dalles, Oreg.....	32.2	May 19.....	0.5	Aug. 27-29.....	12.3	31.7				{ Sept. 30-Oct. 4.. }			